Forest Site Management Section

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SILVICULTURE NOTE 15

PROGRESS REPORT

SX TRIAL 89-123-Q

FERTILIZATION OF INTERIOR SPRUCE (SX), LODGEPOLE PINE (PLI) AND DOUGLAS-FIR (FDI) AT THE TIME OF PLANTING TILLIS LANDING, FIVE-YEAR RESULTS

Introduction

Fertilization at the time of planting (FAP) has, in many parts of the province, become a routinely prescribed regeneration practice. It is prescribed to deal with a wide variety of perceived limitations to seedling establishment, including general planting check. This trial examines the effect of two different rates of FAP fertilizer on Fdi, Sx and Pli seedlings.

Sites

The Tillis Landing sites are located northwest of Salmon Arm in the Salmon Arm Forest District (Figure 1). The Tillis Landing test sites are divided across several ecosystems in the Thompson variant of the moist, warm Interior Cedar-Hemlock zone (Table 1). Site 1 is generally richer and wetter than Site 2 and is also more frequented by cattle.

FIGURE 1. Location of Tillis Landing FAP trial.

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TABLE 1. Site conditions for Tillis Landing FAP trials

Site Conditions and History	
Biogeoclimatic zone	ICHmw3
Site series: Site 1	(01) HwCw–Falsebox–Feathermoss (06) CwHw–Oak fern
Site series: Site 2	(04) CwFd–Soopolallie Twinflower (05) CwFd–Falsebox
Moisture/Nutrient regime: Site 1	4–5/D
Moisture/Nutrient regime: Site 2	3–4/C
Logged: Site 1	1986–87
Logged: Site 2	1985–86
Site preperation	Broadcast burned 1988
Planted	1989

Species and Stock Type

There were three species used in this test (Table 2). All species are considered acceptable for the sites. All stock was spring-planted in 1989. The Fdi stock was nearly twice as large as the other species at planting.

TABLE 2. Species, stock type combinations used at Tillis Landing FAP trial

Species	Seedlot	Stock type	Height at planting
Fdi	8144	PSB 313A 1+0	30 cm
Sx	8150	PSB 313A 1+0	16 cm
Pli	27028	PSB 211A 1+0	17 cm

Treatments

There were two FAP treatments per species (Table 3). The fertilizer was placed in the bottom of the planting hole adjacent to the seedlings. Fertilization differed only in the rate of application: one or two tea bags of fertilizer per seedling.

TABLE 3. FAP treatment combinations used at Tillis Landing FAP trial

Treatment	Formulation	Duration (month)	Fertilizer rate (g/tree)	N rate (g N/tree)
Control				
GROMAX #1™*	12-5-8	24	12.0	1.44
GROMAX #2™**	12-5-8	24	24.0	2.88

* Gromax #1 = 1 teabag per seedling.

** Gromax #2 = 2 teabags per seedling.

The rate of N applied is considerably less than that normally prescribed as a broadcast surface application. GROMAX is an ammonia-rich N-source that releases its contents by rupturing rather than dissolving. The fertilizer is also blended with a hydrophilic gel to improve the soil moisture content around the seedling at planting. The duration of the fertilizer release is rated as 24-months for a specific combination of soil moisture and temperature. The expected duration of release is determined under laboratory conditions for specific temperatures and moisture content. Given the cooler soil temperatures and site conditions it is possible that the fertilizer may last longer on the site than under the standard release conditions quoted by the manufacturer.

Results

FAP did not alleviate planting check in the first two years after planting, with the possible exception of Pli on Site #2 (Figure 2). The site, species and treatment differences that exist in this trial have occurred after the third growing season.

Survival

The largest differences in survival are between species and ecosystems (Figure 3). Pli and Sx survived better than Fdi at both sites. The survival on the drier site (Site 2) was better than on the wetter site, reflecting differences in frost and cattle damage. A fertilizer rate effect was also evident on the drier site. The double fertilizer rate on this site, had about 5% poorer survival than the single fertilizer rate or the control, implicating fertilizer damage as the cause. The low survival of Pli at Site 1 is due to cattle damage. There was no differential frost or browse damage observed between fertilized and unfertilized seedlings.

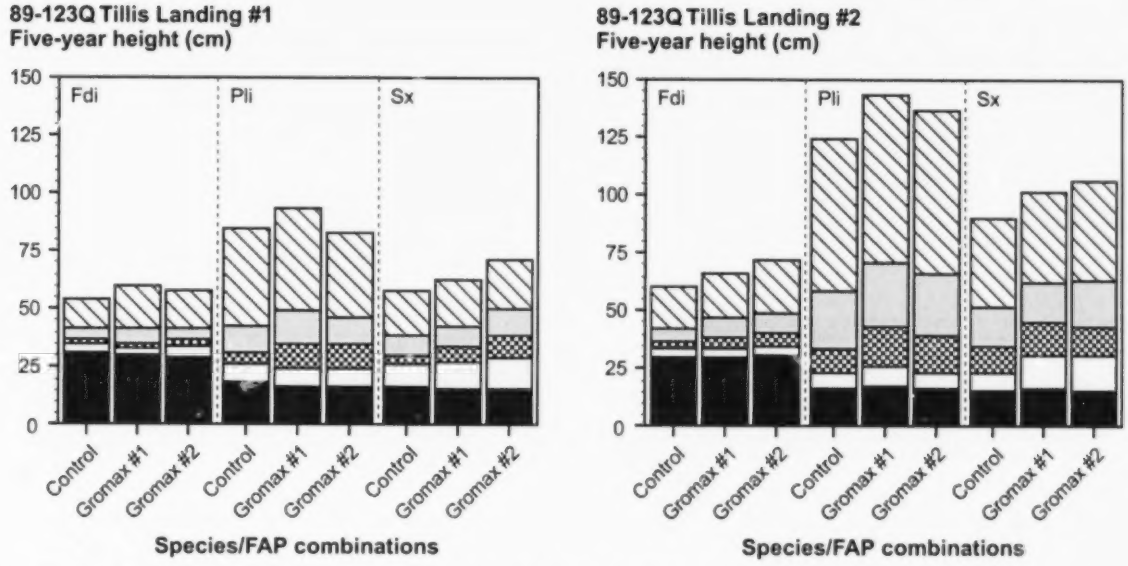
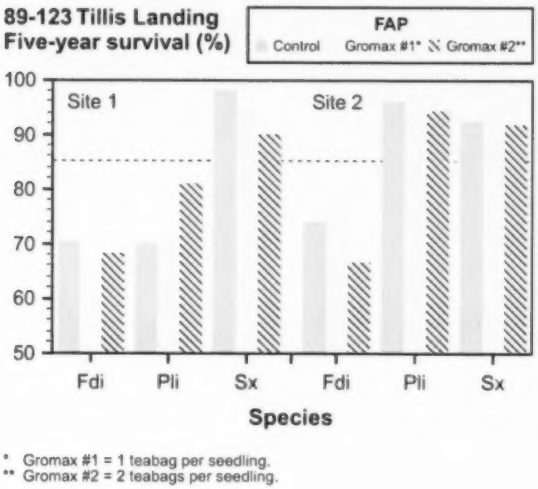


FIGURE 2. Annual height increment for all species/FAP combinations at Tillis Landing. Different shaded bars represent the successive height increments from planting (■).



* Gromax #1 = 1 teabag per seedling.
** Gromax #2 = 2 teabags per seedling.

FIGURE 3. Five-year survival of FAP/species combinations at Tillis Landing trial. The horizontal line at 85% is a reference line of silviculturally acceptable survival.

Height Growth

There are large height growth differences between species and across sites — seedlings on Site 2 are nearly twice as large as those on Site 1 (Figure 4). Growth on the wetter site, Site 1, is much less than on the drier site, due to frost and cattle damage. Any differences between the fertilizer rates are better expressed on the drier site. Although the height differences between fertilizers are considered statistically significant, they measure on average, only 5–10 cm taller and are of little practical significance after five years. The fertilizer treatments also tend to be more variable with respect to growth than the unfertilized treatments, possibly due to inconsistencies in the placement of the fertilizer and or interaction of the fertilizer with microsite placement.

The fertilizer appears to have moderated planting check in the first two years, but subsequent annual height increments are growing equally well, indicating that the fertilizer effect has not persisted.

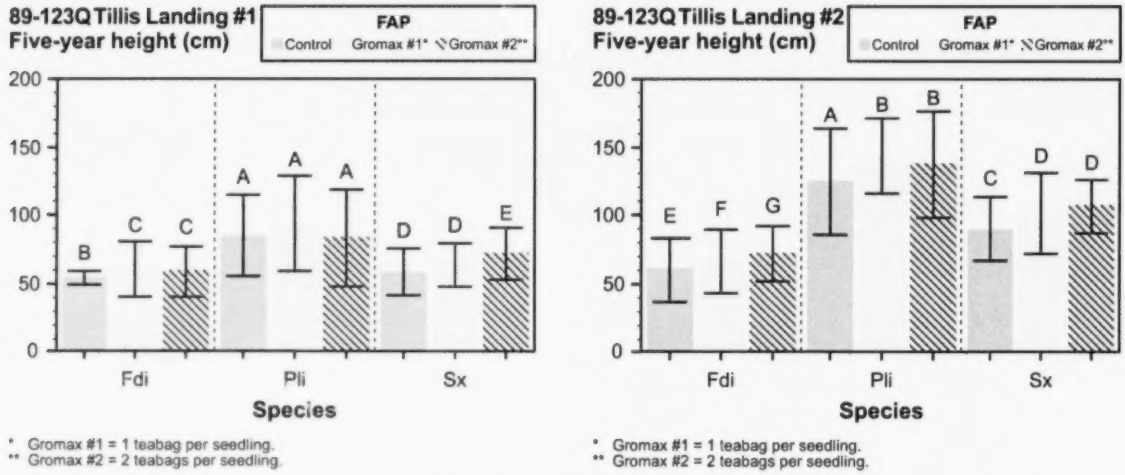


FIGURE 4. Fifth-year total height growth and standard error of the mean for different FAP/ species combinations at Tillis Landing FAP trial. Treatment means marked with the same letter are not considered statistically significantly different at a probability of 5%. The error bar about the mean five-year height is the standard error of the mean.

Conclusions and Recommendations

FAP was site specific in alleviating planting check for the first two years for Pli, Fdi and Sx. The effect has not persisted and the differences seen after five years are of little practical significance. The next expected assessment will be in 1996 at which time a free growing survey will also be conducted.